

U.S. Army Corps of Engineers Focus on Long Term Monitoring

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Long Term Monitoring: Definition

**“Testing of groundwater over an extended
time period in order to document ground
water conditions.”**

Dependent on funding, regulations, agency
directives



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LTM Cost Projections

- Army
 - 1350 sites (current/scheduled)
 - FY 2000 – FY2010 =~ \$460 million
- DOE
 - \$100 million/year (70 years)
- Navy
 - \$80 million/year



50%-70% ON SAMPLING AND TESTING!!

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LTM Measurements

- Chemical Data (contaminants, pH)
- Physical Data (water levels, temperature)
- Bacteria (types, numbers)



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LTM Focus Area

- Time frame: FY2003 – FY2009.
- \$9,000,000 budgeted with greater than \$12 Million in unfunded requirements.



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Goals of LTM Focus Area

- Quick Turnaround.
- Comparable field data to fixed lab data.
- 25%-50% analysis cost reduction.
- User-portable and user-friendly.
- Acceptable to Federal, State, and Local Regulatory Agencies.
- Applicable to Military Unique Compounds (MUCs – Exp/Perchlorate/TCE/BTEX).



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Strategies to Reach Goals

1. Deployment of currently available commercial and government technologies that will reduce the present operational costs, (COTS/GOTS).



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Strategies (continued)

2. Development and implementation of new protocols for acquiring definitive data outside the analytical laboratory.



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Strategies (continued)

3. Development and deployment of new and emerging technologies for Real Time In-Situ Monitoring Systems (RTISMS). Examples are sensors and miniaturized systems.



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1. Current Technologies to Reduce Costs

- Sampling (ERDC/CRREL TR-02-12)
 - Kabis
 - Hydra Sleeve
 - Discrete Interval
 - Pneumo-Bailer
 - USGS Passive Diffusion Bag Sampler (BNA/metals – fall 2003)



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- **Testing (<http://fate.clu-in.org/technologies.htm>)**
 - **Test Kits**
 - **Fiber Optic Chemical Sensors**
 - **Gas Chromatography/ Mass Spectrometry**
 - **Immunoassay**
 - **Laser Induced Fluorescence**



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- **Monitoring Well Sampling**
 - **“Long-Term Groundwater Monitoring – The State of the Art”**
 - **Optimal number of wells**
 - **Wells in place: less frequency**



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2. New Protocols for Definitive Data (SW-846)

“Can the end user get adequate data quality to meet the
goals of the data gathering activity?”

Use of Data Quality Objectives (DQO's)

Working with ITRC and EPA to promote Triad.



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- **Quality Control Components (Fixed Laboratory)**
 - A. Calibration**
 - B. Method Detection Limits**
 - C. Blanks**
 - D. Matrix/Field Duplicates**
 - E. Matrix Spike/Matrix Spike Duplicate**
 - F. Control Spikes**
 - G. Surrogates (Organics)**



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Fixed Lab HPLC (explosives) SW-846, method 8330



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3. Real Time In-Situ Monitoring Systems (RTISMS)

- Internet and Literature Search:
 - SERDP/ ESTCP (Explosives/VOC's)
 - Sandia National Laboratories (VOC's)
 - Sensor Technology Information Exchange (SENTIX)
 - Pacific Northwest National Laboratory (PNNL)



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- RUGGEDNESS (lab = maybe; field = ?)
 - Turbidity/Biofouling/Cables/ Power Supply/
Breakage/Remote Sites/Training

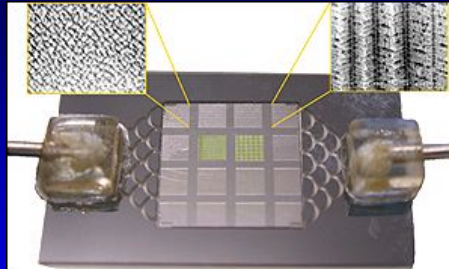
USACE's interest is to take technologies that demonstrate promise and develop them to be effective in the field.



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Lab on a Chip



Researchers at Cardiff University, UK used hydrofluoric acid to carve millions of tiny pores into a silicon chip to miniaturize conventional chromatographic detection technology. This allows the small chip to separate mixtures and identify their various components.



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Future Considerations/ Issues

- Development of In-Situ Devices
 1. Robust/ Reliable
 2. Easy to Use
 3. Transmit Data Offsite
- Acceptance by Regulators
 1. Detection Limits
 2. Quality Control



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Future Considerations/ Issues (continued)

- Dissemination of Information for Implementation
 1. Web site
 2. National Conferences
 3. Workshops
 4. EPA Method Approval (SW-846)



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Milestones

- Winter 2003 – GOTS/COTS Overview document and website.
- Fall 2004 – Laboratory testing of promising GOTS/COTS.
- Winter 2005 – Field testing results completed and published.
- Fall 2006 – Dissemination of implementation guidance (conferences, briefings, etc.).



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Conclusions

- Traditional LTM Analysis: costly!
- Sampling Strategies: helpful.
- Field Methods: need to expand.
- Sensor Technologies: need to expand.

US Army Corps of Engineers, in partnership with
AEC, Focus Area is to resolve issues and
promote technologies.



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